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Remarks

Applicants appreciate the thorough and detailed examination of the present application as evidenced by the Office Action dated July 27, 2005 (hereinafter, the "Office Action"). Claims 24, 25, 27-35, 45-50, 55 and 58 are pending in the present application. Claims 24, 25, 27-35, 45-50, 55 and 58 stand rejected. Applicants respectfully submit that the pending claims are patentable over the cited references for at least the reasons discussed herein.

I. Claim Rejections Under 35 U.S.C. § 102(e)

Claims 27, 31, 34, 55 and 58 stand rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 5,989,999 to Levine et al. (hereinafter, "Levine et al."). See Office Action, page 2. Applicants respectfully disagree with this assertion.

"Anticipation under 35 U.S.C. § 102 requires the disclosure in a single piece of prior art of each and every limitation of a claimed invention." *Apple Computer Inc. v. Articulate Systems Inc.* 57 USPQ2d 1057, 1061 (Fed. Cir. 2000) (relying on *Electro Med. Sys. S.A. v. Cooper Life Scis.*, 32 USPQ2d 1017, 1019 (Fed. Cir. 1994)). A finding of anticipation further requires that there must be no difference between the claimed invention and the disclosure of the cited reference as viewed by one of ordinary skill in the art. See *Scripps Clinic & Research Foundation v. Genentech Inc.*, 927 F.2d 1565, 1576, 18 U.S.P.Q.2d 1001, 1010 (Fed. Cir. 1991). Additionally, the cited prior art reference must be enabling, thereby placing the allegedly disclosed matter in the possession of the public. *In re Brown*, 329 F.2d 1006, 1011, 141 U.S.P.Q. 245, 249 (C.C.P.A. 1964).

Independent Claim 27 recites as follows:

27. An apparatus for forming a thin film on a substrate, the apparatus comprising:
a multi-functional chamber configured to deposit a dielectric layer on the substrate, wherein the multi-functional chamber comprises:
a support plate configured to hold the substrate;
a heater unit positioned under the support plate;
a source dispersion device positioned above the support plate and configured to uniformly disperse organic source liquid;
a source supplier in fluid communication with the source dispersion device; and
an oxygen radical or plasma annealing unit connected to the multi-functional chamber and configured to provide oxygen radical or plasma gas to the multi-functional chamber to oxygen radical or plasma anneal one or more electrode and/or dielectric layers on the substrate in the

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multi-functional chamber, said oxygen radical or plasma annealing unit comprising a gas source selected from the group consisting of O₂, NH₃, Ar, N₂, and N₂O.

Applicants respectfully submit that at least the highlighted recitations are not taught or suggested by Levine et al. Levine et al. does not disclose or teach a source supplier in fluid communication with the source dispersion device as recited in Claim 27. Instead, Levine et al. discusses a "bubbler containing Ti(NR₂)₄..." Levine et al., Col. 17, line 1. A general description of a "bubbler" does not teach one of ordinary skill in the art to utilize the source supplier as recited in Claim 27. Moreover, there is no disclosure of "a source supplier in fluid communication with the source dispersion device" in Levine et al. Additionally, Levine et al. fails to teach an oxygen radical or plasma annealing unit connected to the multi-functional chamber. Alternatively, Levine et al. describes an rf source, which applies rf power to the showerhead. See Levine et al., Col. 9, lines 3-7. There is no discussion regarding how the rf source could be used as an oxygen radical or plasma annealing unit as recited in Claim 27.

Therefore, at least in view of the missing recitations, Applicants respectfully submit that Levine et al. does not anticipate Claim 27. Dependent Claims 31, 34, 55 and 58 are patentable at least based upon the patentability of Claim 27 from which Claims 31, 34, 55 and 58 depend.

Further, Applicants respectfully submit that Claims 31 and 34 are separately patentable for at least the following reasons.

Claim 31 recites as follows:

31. The apparatus of claim 23, further comprising:
a loadlock chamber configured to introduce the substrate into the apparatus; and
a transfer chamber connected to the loadlock chamber and configured to transfer the substrate from a first chamber to a second chamber, wherein the multi-functional chamber is connected to the transfer chamber.
Contrary to the Examiner's assertion, Levine et al. does not present a loadlock

chamber or a transfer chamber in figure 4. At most, Levine et al. discusses a multichamber vacuum system and does not discuss a "loadlock chamber" or "transfer chamber." See Levine et al., Col. 7, lines 52 through Col. 8, line 10. Thus, Claim 31 is patentable over Levine et al.

Similar to the analysis above, Levine et al. does not disclose an "oxygen radical or plasma annealing chamber configured to pre-treat a lower electrode and connected to the transfer chamber" as recited in Claim 34. Therefore, Claim 34 is patentable over Levine et al.

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For at least these reasons, Applicants respectfully submit that Claims 27, 31, 34, 55 and 58 are patentable over Levine et al. Accordingly, Applicants respectfully request that the rejection of Claims 27, 31, 34, 55 and 58 under 35 U.S.C. §102(e) be withdrawn for at least these reasons.

II. Claim Rejections Under 35 U.S.C. § 103

A. Claims 28 and 29 are patentable over Levine et al. in view of Yamada et al.

Claims 28 and 29 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Levine et al. and further in view of U.S. Patent No. 5,501,739 to Yamada et al. (hereinafter, "Yamada et al.") See Office Action, page 3. Applicants respectfully disagree with this assertion.

Three basic criteria must be met in order to establish a *prima facie* case of obviousness: 1) The prior art must teach or suggest all the claim recitations. See *In re Wilson*, 57 C.C.P.A. 1029, 1032 (C.C.P.A., 1970); 2) There must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify or combine references teachings in order to achieve the claimed invention. See *In re Oetiker*, 24 U.S.P.Q.2d 1443, 1446 (Fed. Cir. 1992); *In re Fine*, 837 F.2d at 1074; *In re Skinner*, 2 U.S.P.Q.2d 1788; 1790 (Bd. Pat. App. & Int. 1986); and 3) There must be a reasonable expectation of success. See M.P.E.P. § 2143. Further, concerning the second criteria, the Court of Appeal for the Federal Circuit emphasized that, to support combining references, evidence of a suggestion, teaching, or motivation to combine must be **clear and particular**. See *In re Dembiczak*, 175 F.3d 994, 999 (Fed. Cir. 1999). Broad conclusory statements regarding the teaching of multiple references, standing alone, are not "evidence" of obviousness. *Id.*

As discussed above, at a minimum, Levine et al. does not teach "a source supplier in fluid communication with the source dispersion device" or "an oxygen radical or plasma annealing unit connected to the multi-functional chamber" as recited in Claim 27. Thus, in order to establish a *prima facie* case of obviousness, Yamada et al. must not only disclose additional recitations of Claims 28 and 29 but also teach or suggest the above missing recitations of Claim 27 in order to cure the deficiencies of Levine et al.

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Based upon our understanding of the reference, Yamada et al. does not teach an "evaporator in fluid communication with the flow controller and configured to evaporate the source liquid" as recited in Claim 28. Yamada et al. further does not disclose "between 1 and 3 evaporators" as recited in Claim 29. Instead, Yamada et al. discusses the following:

Subsequently, the valve 117 communicating with the organic liquid container 113 is opened to reduce the pressure inside the organic liquid container 113 and the organic material gas feed pipe 116 which connects the valve 117 with the vacuum chamber 102. The boiling point of the organic liquid material (HMDS) is consequently decreased to promote vaporization. The organic liquid material is thus supplied onto the substrate 101 in the vacuum chamber 102.

Yamada et al., Col. 7, lines 15-22. In the above paragraph, also cited by the Examiner, a process for delivering HMDS has been described, however, an evaporator as recited in Claims 28 or 29 is not discussed. Moreover, Yamada et al. does not teach or suggest an "oxygen radical or plasma annealing unit connected to the multi-functional chamber." Thus, Yamada et al. does not cure the deficiencies of Levine et al. At least in view of the above missing recitations, the combination of Levine et al. and Yamada et al. does not teach or suggest all the recitations of Claims 28 and 29.

Accordingly, Applicants respectfully submit that Claims 28 and 29 are not obvious over Levine et al. in view of Yamada et al. for at least above reasons, and Applicants respectfully request that the rejection of Claims 28 and 29 under 35 U.S.C. § 103(a) be withdrawn.

B. Claim 35 is patentable over Levine et al. in view of Yamada et al.

Claim 35 stands rejected under 35 U.S.C. § 103(a) as being obvious over Levine et al. in view of Yamada et al. *See* Office Action, page 4. Applicants respectfully disagree with this assertion.

Claim 35 depends from Claim 31, and for at least reasons related to the patentability of Claim 31 as discussed above, Levine et al. does not teach or suggest the recitations of Claim 35. Applicants respectfully submit that Yamada et al. does not teach or suggest the missing recitations of Claim 31 in order to cure the deficiencies of Levine et al.

Yamada et al. does not teach or suggest "a cooling chamber connected to the transfer chamber; and a pre-heating chamber connected to the transfer chamber" as recited in Claim 35. Additionally, Yamada et al. does not teach or suggest a "loadlock

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chamber configured to introduce the substrate into the apparatus; and a **transfer chamber connected to the loadlock chamber**" as recited in Claim 31. Thus, Yamada et al. does not cure the deficiencies of Levine et al. Therefore, in view of the missing recitations, Levine et al. and Yamada et al. do not teach or suggest the recitations of Claim 35.

Accordingly, Applicants respectfully submit that Claim 35 is not obvious over Levine et al. in view of Yamada et al. for at least the reasons discussed above, and Applicants respectfully request that the rejection of Claim 35 under 35 U.S.C. § 103(a) be withdrawn.

C. Claim 30 is patentable over Levine et al. in view of Benzing

Claim 30 stands rejected under 35 U.S.C. § 103(a) as being obvious over Levine et al. in view of U.S. Patent No. 4,786,352 to Benzing (hereinafter, "Benzing"). See Office Action, page 4. Applicants respectfully disagree with this assertion.

Claim 30 depends from Claim 27, and for at least reasons related to the patentability of Claim 27 as discussed above, Levine et al. does not teach or suggest the recitations of Claim 27. Applicants respectfully submit that Benzing does not teach or suggest the missing recitations of Claim 27 in order to cure the deficiencies of Levine et al.

Benzing does not teach or suggest "a cleaning gas supplier in fluid communication with the multi-functional chamber and configured to supply cleaning gas to remove dielectric material from a wall of the multi-functional chamber" as recited in Claim 30. Additionally, Benzing fails to teach or suggest the "source supplier" or "an oxygen radical or plasma annealing unit" as recited in Claim 27. Thus, Benzing does not cure the deficiencies of Levine et al. Therefore, in view of the missing recitations, Benzing and Levine et al. do not teach or suggest all the recitations of Claim 30.

Accordingly, Applicants respectfully submit that Claim 30 is not obvious in view of the combination of Levine et al. and Benzing for at least the reasons discussed above, and Applicants respectfully request that the rejection of Claim 30 under 35 U.S.C. § 103(a) be withdrawn.

D. Claims 32 and 33 are patentable over Levine et al. in view of Yamazaki et al.

Claims 32 and 33 stand rejected under 35 U.S.C. § 103(a) as being obvious over Levine et al. in view of U.S. Patent No. 5,804,471 to Yamazaki et al. (hereinafter, "Yamazaki et al"). See Office Action, page 5. Applicants respectfully disagree with this assertion.

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Claims 32 and 33 depend from Claim 31, and for at least reasons related to the patentability of Claim 31 as discussed above, Levine et al. does not teach or suggest the recitations of Claims 32 or 33. Applicants respectfully submit that Yamazaki et al. does not teach or suggest the missing recitations of Claim 31 in order to cure the deficiencies of Levine et al.

Yamazaki et al. does not teach or suggest "an electrode deposition chamber **connected to the transfer chamber**" as recited in Claims 32, or "a crystallization annealing chamber **connected to the transfer chamber**" as recited in Claim 33. Therefore, in view of the missing recitations, the combination of Levine et al. and Yamazaki et al. does not teach or suggest all the recitations of Claim 32 or 33.

Accordingly, Applicants respectfully submit that Claims 32 and 33 are not obvious in view of the combination of Levine et al. and Yamazaki et al. for at least the reasons presented above, and Applicants respectfully request that the rejection of Claims 32 and 33 under 35 U.S.C. § 103(a) be withdrawn.

E. Claim 24 is patentable over Levine et al. in view of Moslehi et al.

Claim 24 stands rejected under 35 U.S.C. § 103(a) as being obvious over Levine et al. in view of U.S. Patent No. 5,217,559 to Moslehi et al. (hereinafter, "Moslehi et al."). See Office Action, page 5. Applicants respectfully disagree with this assertion.

Claim 24 depends from Claim 27, and for at least reasons related to the patentability of Claim 27 as discussed above, Levine et al. does not teach or suggest the recitations of Claim 24. Applicants respectfully submit that Moslehi et al. does not teach or suggest the missing recitations of Claim 27 in order to cure the deficiencies of Levine et al.

Moslehi et al. indicates that "the plasma species may be generated by a remote microwave or a radio-frequency discharge plasma source." Moslehi et al., Col. 4, lines 16-21. Based on the above general statement, one of ordinary skill in the art will not know how to make and use the plasma generator recited in Claim 24. Moreover, Applicants respectfully submit that Moslehi et al. does not cure the deficiencies of Levine et al. Therefore, in view of the missing recitations, the combination of Moslehi et al. and Levine et al. does not disclose or suggest all the recitations of Claim 24.

Accordingly, Applicants respectfully submit that Claim 24 is not obvious in view of the combination of Levine et al. and Moslehi et al. for at least the reasons presented above,

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and Applicants respectfully request that the rejection of Claim 24 under 35 U.S.C. § 103(a) be withdrawn.

F. Claim 25 is patentable over Levine et al. in view of Montev et al.

Claim 25 stands rejected under 35 U.S.C. § 103(a) as being obvious over Levine et al. in view of U.S. Patent No. 4,578,880 to Montev et al. (hereinafter, "Montev et al."). See Office Action, page 6. Applicants respectfully disagree with this assertion.

Claim 25 depends from Claim 27, and for at least reasons related to the patentability of Claim 27 as discussed above, Levine et al. does not teach or suggest the recitations of Claim 25. Applicants respectfully submit that Montev et al. does not teach or suggest the missing recitations of Claim 27 in order to cure the deficiencies of Levine et al.

Montev et al. indicates that "exhaust means are provided for removing ozone from the interior of the housing at the curing station adjacent the Ultraviolet lamp." Montev et al., Col. 8, lines 23-30. Montev et al. does not teach or suggest "an ozone remover connected to an exhaust end of the multi-functional chamber" as recited in Claim 25. Moreover, Applicants respectfully submit that Montev et al. does not cure the deficiencies of Levine et al. Therefore, in view of the missing recitations, the combination of Montev et al. and Levine et al. does not disclose or suggest all the recitations of Claim 25.

Accordingly, Applicants respectfully submit that Claim 25 is not obvious in view of the combination of Levine et al. and Montev et al. for at least the reasons presented above, and Applicants respectfully request that the rejection of Claim 25 under 35 U.S.C. § 103(a) be withdrawn.

G. Claims 45, 46, 49 and 50 are patentable over Levine et al. in view of Yamada et al. and further in view of Benzing

Claim 45, 46, 49 and 50 stand rejected under 35 U.S.C. § 103(a) as being obvious over Levine et al. in view of Yamada et al. further in view of Benzing.¹ See Office Action, page 6. Applicants respectfully disagree with this assertion.

¹ Applicants believe the Office Action intended the obviousness rejection to be made over Levine et al. in view of Yamada et al. and further in view of Benzing rather than over U.S. Patent No. 5, 501,739 to Yamada et al. in view of "U.S. Patent No. 6,096,597 to Tsu et al." in view of U.S. Patent 4,786,352 to Benzing as stated on page 6 of the Office Action since the subsequent comments relate to the Levine et al., Yamada et al. and Benzing references.

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Claim 45 is an independent claim, and Claims 46, 49 and 50 depend directly or indirectly therefrom.

Claim 45 is patentable over Levine et al. in view of Yamada et al. and further in view of Benzing, at least for similar reasons related to the analysis stated above for Claim 27. In particular, Levine et al. does not teach or suggest "a source supplier in fluid communication with the source dispersion device, said source supplier comprising: an organic liquid source . . ." as recited in Claim 45. Additionally, similar to the analysis stated above for Claim 28, Yamada et al. does not teach or suggest "an evaporator in fluid communication with the flow controller and configured to evaporate the source liquid" as recited in Claim 46. Moreover, similar to the analysis stated above for Claim 30, Benzing does not teach or suggest "a cleaning gas supplier in fluid communication with the multi-functional chamber and configured to supply cleaning gas to remove dielectric material from a wall of the multi-functional chamber" as recited in Claim 45. Therefore, in view of the missing recitations, the combination of Yamada et al., Levine et al. and Benzing do not teach or suggest all the recitations of Claim 45. For at least these reasons, Applicants respectfully submit that Claims 45, 46, 49 and 50 are patentable over Levine et al. in view of Yamada et al. and further in view of Benzing.

Accordingly, Applicants respectfully submit that Claims 45, 46, 49 and 50 are not obvious in view of the combination of Levine et al., Yamada et al. and Benzing for at least the reasons presented above, and Applicants respectfully request that the rejection of Claims 45, 46, 49 and 50 under 35 U.S.C. § 103(a) be withdrawn.

H. Claims 47 and 48 are patentable over Levine et al. in view of Yamada et al. and Benzing and further in view of Yamazaki et al.

Claims 47 and 48 stand rejected under 35 U.S.C. § 103(a) as being obvious over Levine et al. in view of Yamada et al. and Benzing and further in view of Yamazaki et al. See Office Action, page 8. Applicants respectfully disagree with this assertion.

Claims 47 and 48 depend from Claim 46. As discussed above, dependent Claims 47 and 48 are patentable at least based upon the patentability of Claim 46 from which Claims 47 and 48 depend.

Additionally, similar to the discussion above regarding the obviousness rejection of Claims 32 and 33, Yamazaki et al. does not teach or suggest "an electrode deposition chamber connected to the transfer chamber" as recited in Claim 47, or "a crystallization

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annealing chamber connected to the transfer chamber" as recited in Claim 48. Further, Applicants respectfully submit that none of the above cited references cure the deficiencies of Levine et al. Therefore, in view of the missing recitations, the combination of Levine et al., Yamada et al., Benzing and Yamazaki et al. does not teach or suggest all the recitations of Claims 47 and 48.

For at least these reasons, Applicants respectfully submit that Claims 47 and 48 are patentable over Levine et al. in view of Yamada et al. and Benzing and further in view of Yamazaki et al. Accordingly, Applicants respectfully request that the rejection of Claims 47 and 48 under 35 U.S.C §103(a) be withdrawn for at least these reasons.

CONCLUSION

In view of the foregoing amendments and remarks, Applicants respectfully request that all outstanding rejections to the claims be withdrawn and that a Notice of Allowance be issued in due course. The Examiner is invited and encouraged to contact the undersigned directly if such contact will expedite the prosecution of the pending claims to issue. In any event, any questions that the Examiner may have should be directed to the undersigned, who may be reached at (919) 854-1400.

Respectfully submitted,

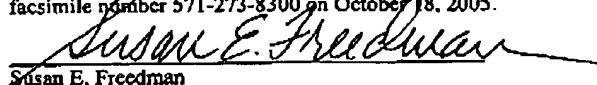


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